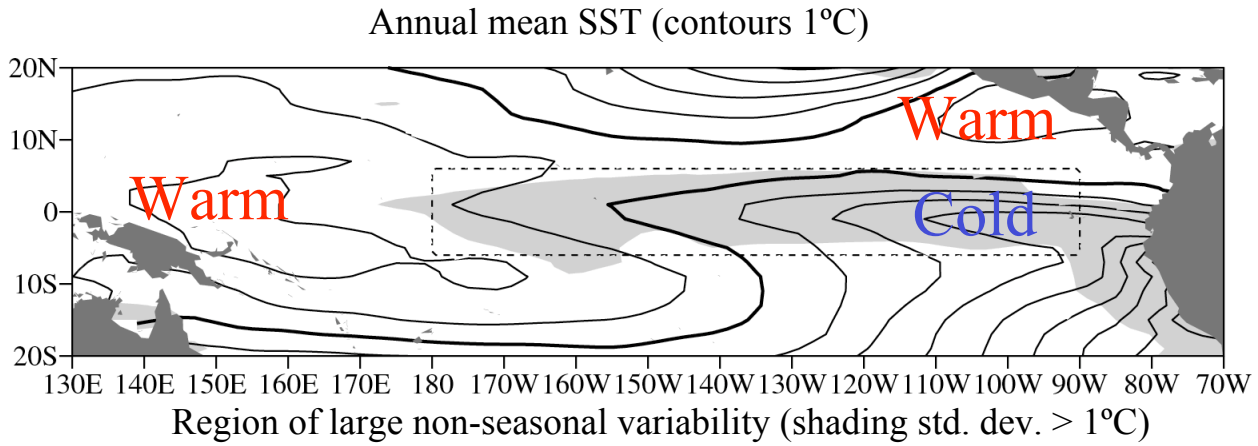
The year after an extreme cold El Niño / Southern Oscillation (ENSO) episode: Verification

Todd Mitchell and Nate Mantua
University of Washington

Examine sea surface temperature (SST) anomalies in the cold tongue region of the central and eastern equatorial Pacific

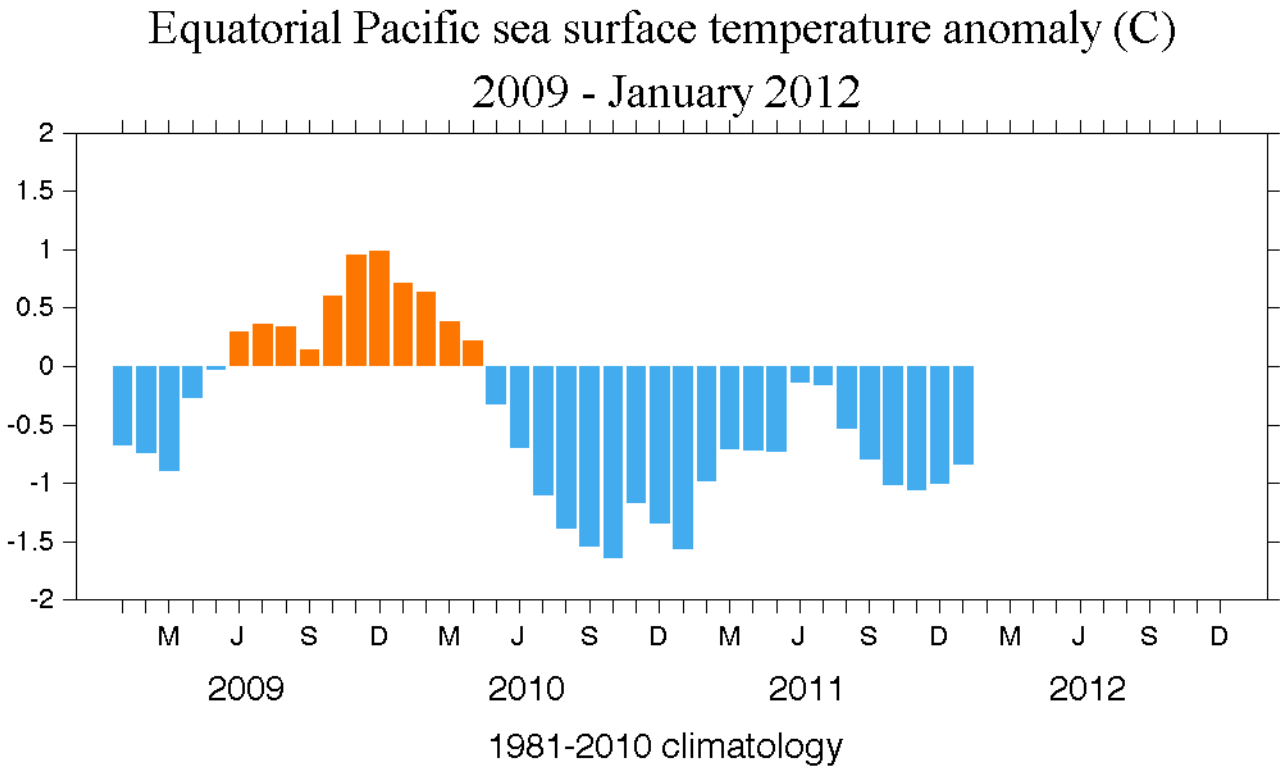


Cold tongue index (CTI) =
average SST anomalies over 5ºN-5ºS, 180-90ºW (dotted line)
minus the global mean SST anomaly

The CTI is comparable to the niño 3.4 SST anomaly index (5ºN-5ºS, 170-120ºW)

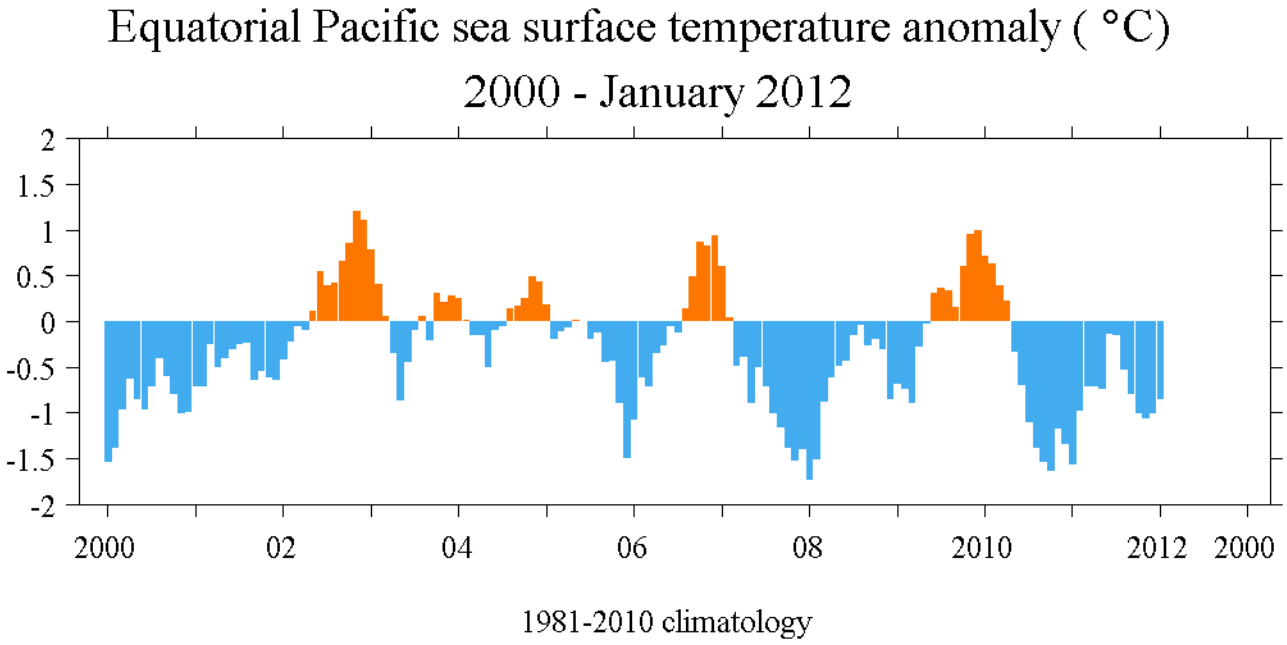
Recent eastern equatorial Pacific climate variability:

- warm 2009-10 winter
- cold 2010-11 and 2011-12 winters

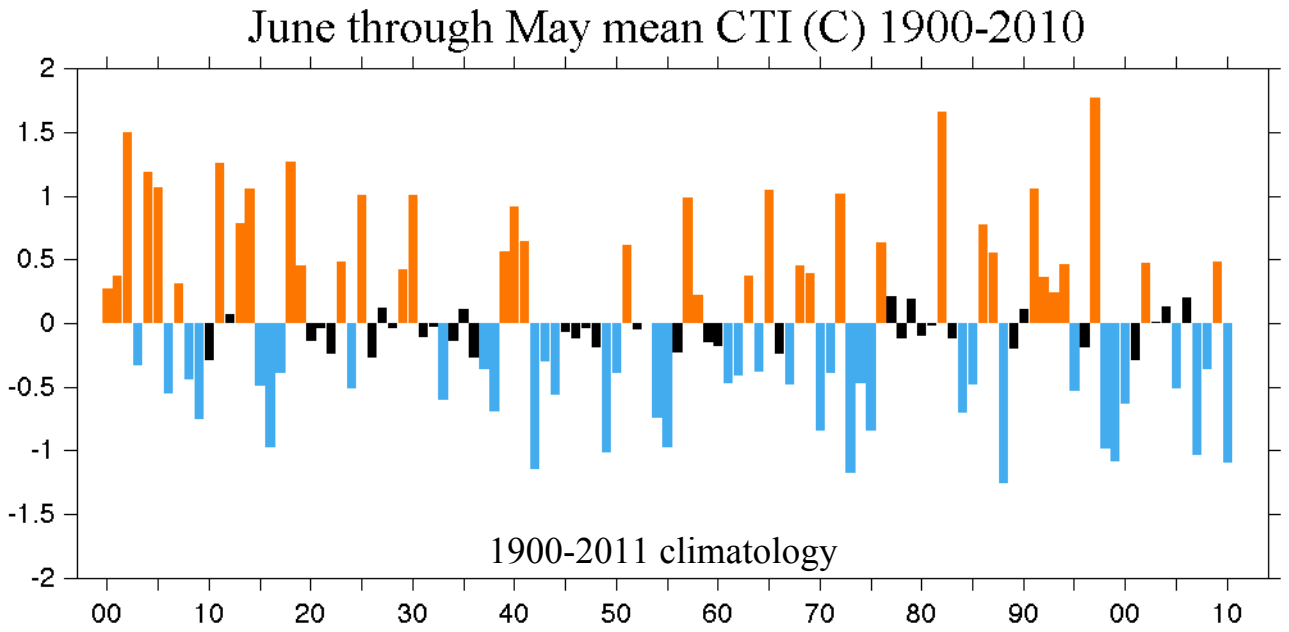


A tendency for episodes to last from May to the following April.

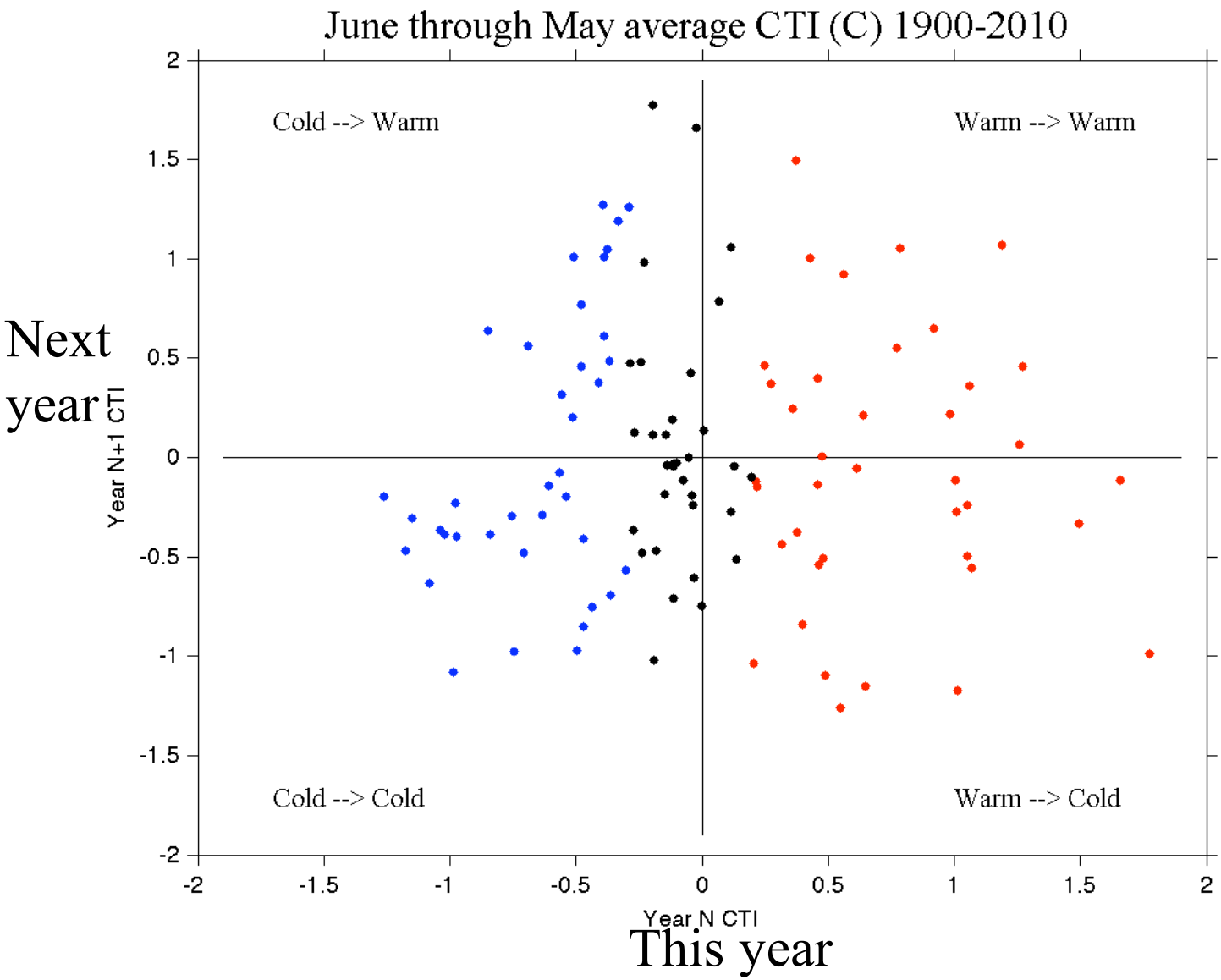
A slightly longer record, 2000 - January 2012: Some episodes can persist for several years



The record beginning in 1900



- 2010-11 stands out as a really cold episode
- The extreme warm episodes, 1982-83 and 1997-98, were followed by cold years
- Some multi-year warm and cold episodes.
- Use this time series to construct an analysis to see if there is any pattern for the evolution of extreme warm and cold years.


June through May average CTI (C) 1900-2010
Cold --> Warm
Warm --> Warm
Cold --> Cold
Warm --> Cold
Next year
Year N+1 CTI
Year N CTI
This year
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2

Recent eastern equatorial Pacific climate variability:

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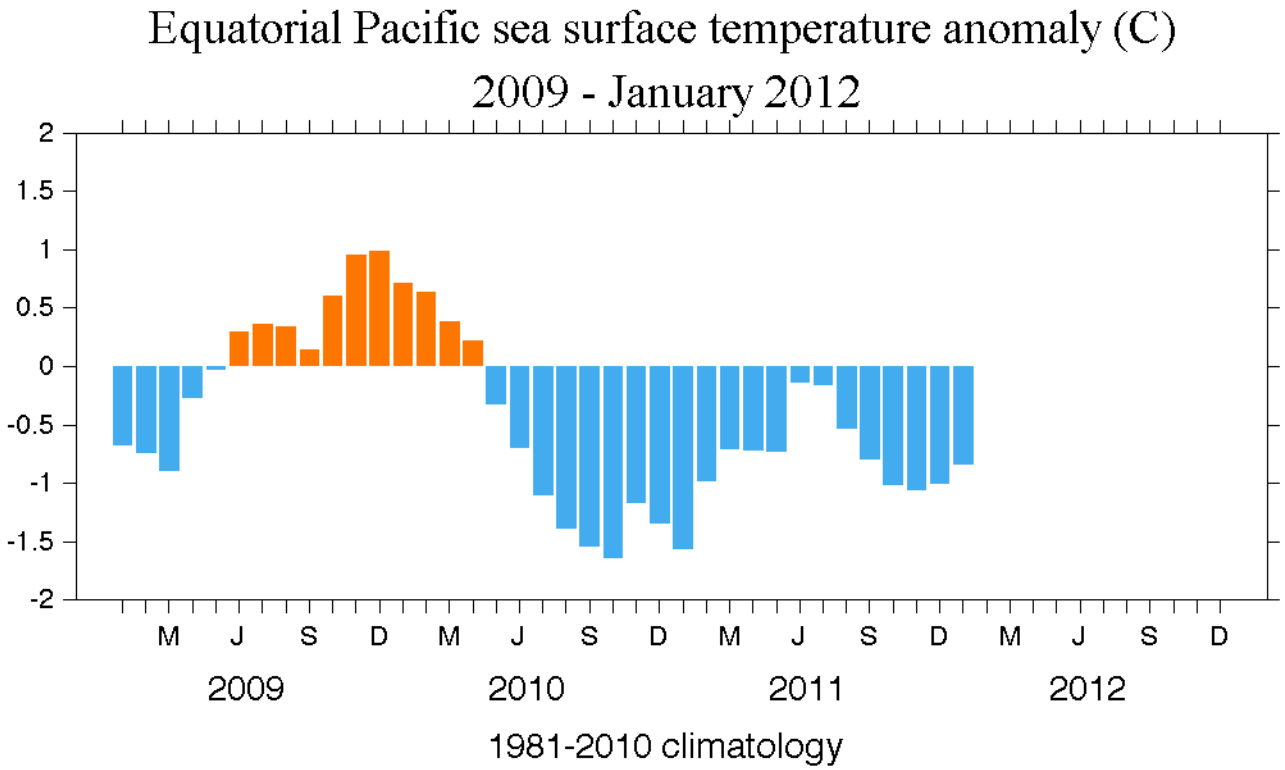


A tendency for episodes to last from May to the following April.

The following year is cold, but less cold (not a surprise when you are looking at the extremes of a distribution).

Okumaru and Deser (2010, *J. Climate*) emphasized that extreme warm or cold ENSO was followed by cold ENSO.

The present analysis says that this is more true for cold leading to cold than warm leading to cold.

The mechanism for the second year behavior is being worked on. Okumaru and Deser emphasized

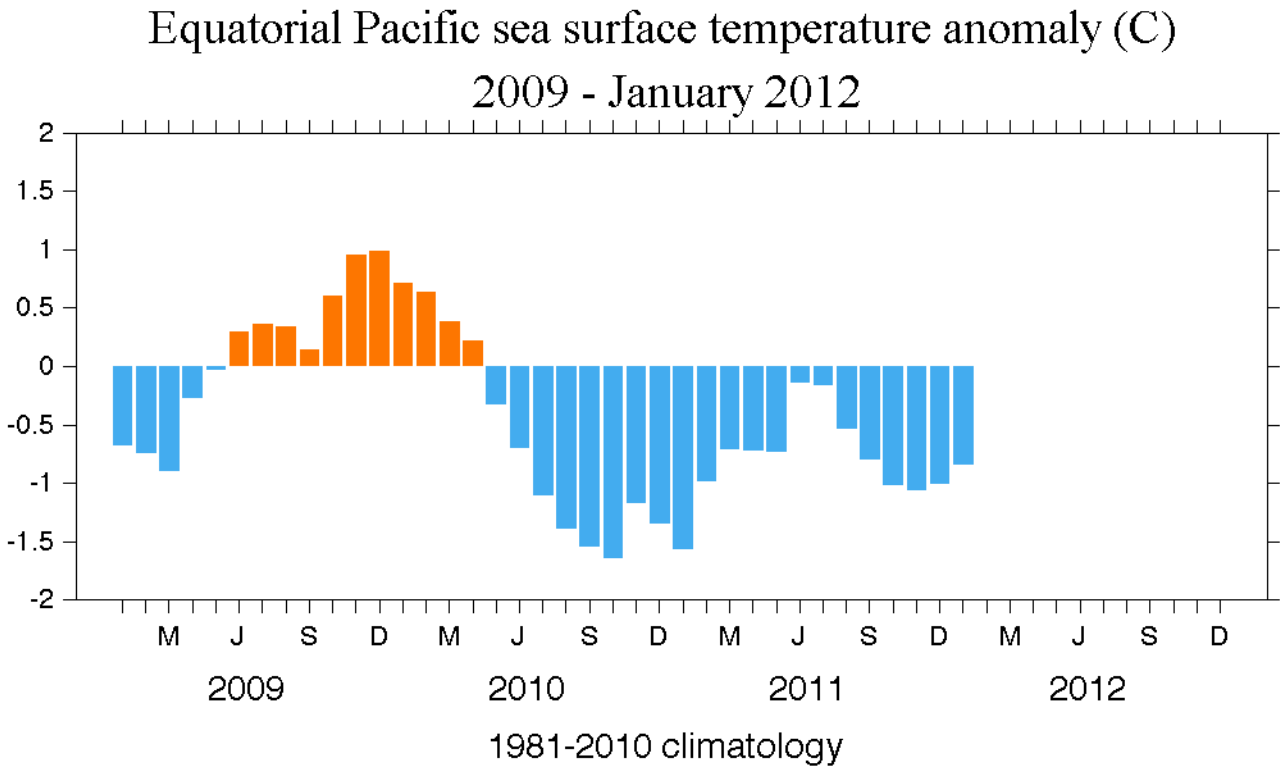
- Cold ENSO precipitation anomalies are farther to the west than for warm episodes. Related winds influence the SST.
- The role of Indian Ocean SST anomalies in forcing the winds over the western Pacific.

So, what's next for ENSO?

Remember that the CTI anomalies tend to be of one sign from June through May.

Recent eastern equatorial Pacific climate variability:

- warm 2009-10 winter
- cold 2010-11 and 2011-12 winters

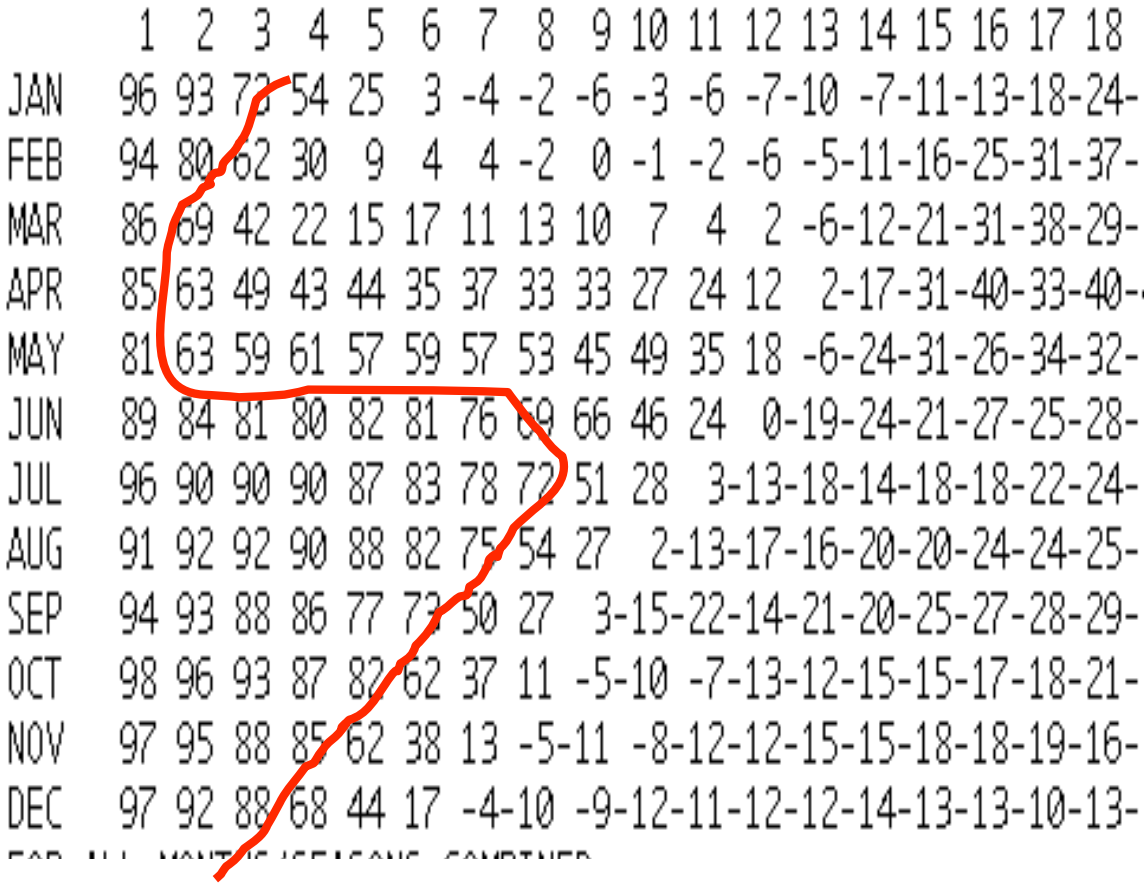


A tendency for episodes to last from May to the following April.

Autocorrelation of the cold tongue SST index stratified by calendar month

Lag in months

Correlations * 100



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
JAN	96	93	73	54	25	3	-4	-2	-6	-3	-6	-7	-10	-7	-11	-13	-18	-24-
FEB	94	80	62	30	9	4	4	-2	0	-1	-2	-6	-5	-11	-16	-25	-31	-37-
MAR	86	69	42	22	15	17	11	13	10	7	4	2	-6	-12	-21	-31	-38	-29-
APR	85	63	49	43	44	35	37	33	33	27	24	12	2	-17	-31	-40	-33	-40-
MAY	81	63	59	61	57	59	57	53	45	49	35	18	-6	-24	-31	-26	-34	-32-
JUN	89	84	81	80	82	81	76	69	66	46	24	0	-19	-24	-21	-27	-25	-28-
JUL	96	90	90	90	87	83	78	72	51	28	3	-13	-18	-14	-18	-18	-22	-24-
AUG	91	92	92	90	88	82	75	54	27	2	-13	-17	-16	-20	-20	-24	-24	-25-
SEP	94	93	88	86	77	73	50	27	3	-15	-22	-14	-21	-20	-25	-27	-28	-29-
OCT	98	96	93	87	82	62	37	11	-5	-10	-7	-13	-12	-15	-15	-17	-18	-21-
NOV	97	95	88	85	62	38	13	-5	-11	-8	-12	-12	-15	-15	-18	-18	-19	-16-
DEC	97	92	88	68	44	17	-4	-10	-9	-12	-11	-12	-12	-14	-13	-13	-10	-13-

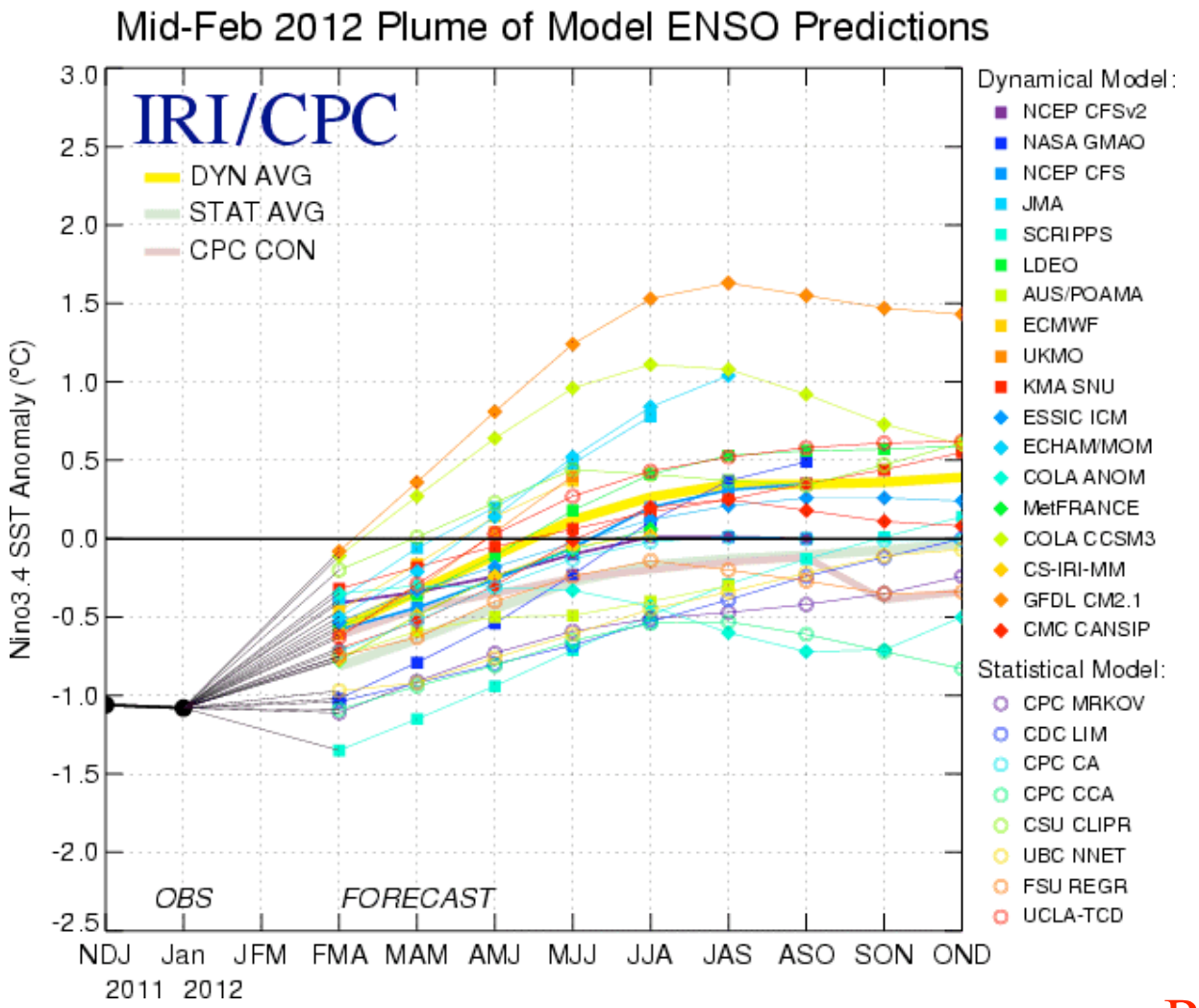
0.7 correlation contour

The fundamental mechanisms of ENSO occur in the equatorial Pacific:

- Ocean dynamics with a scale of 5º latitude
- Atmospheric dynamics with a scale of 15º latitude

Other things can happen outside this region that can affect the basic mechanism

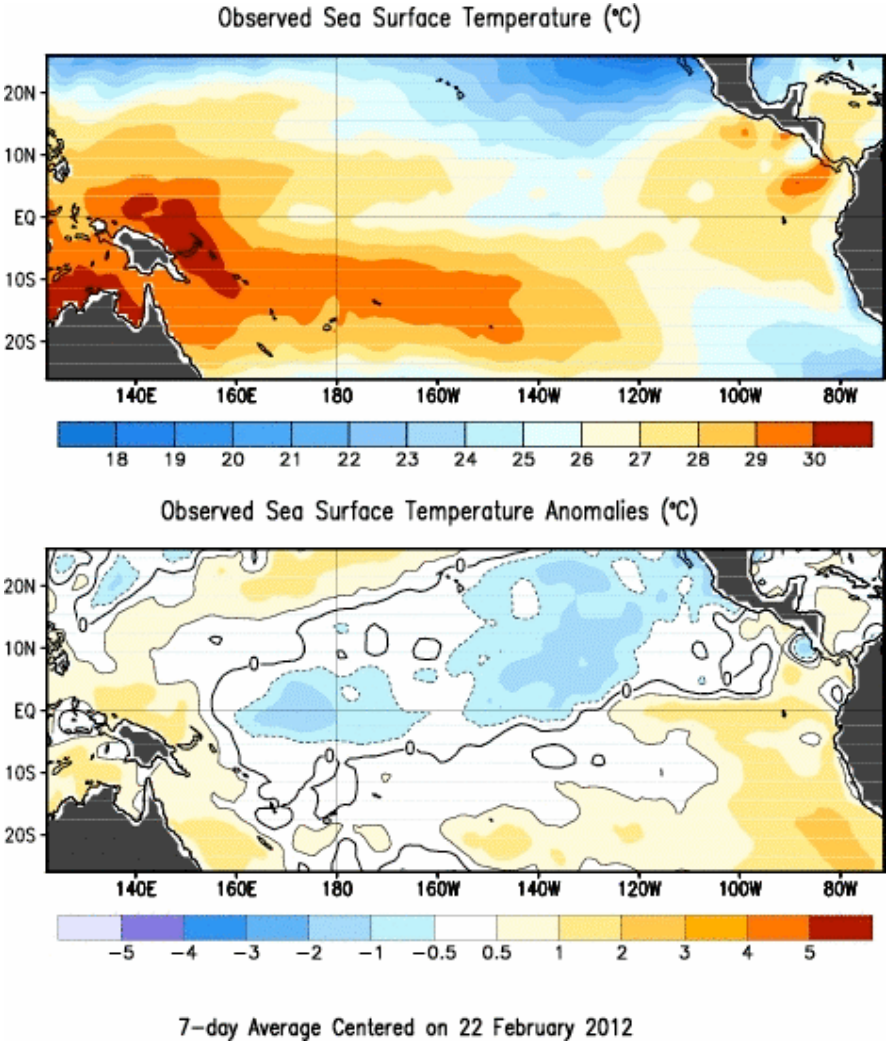
A consequence of this is that ENSO forecast skill looks a lot like the CTI autocorrelation: Except when starting from an extreme year, there isn't much skill in forecasting ENSO from March, April, and May conditions.



Most models forecast ENSO neutral for next winter --- there is very little skill in forecasts initialized at this time of year

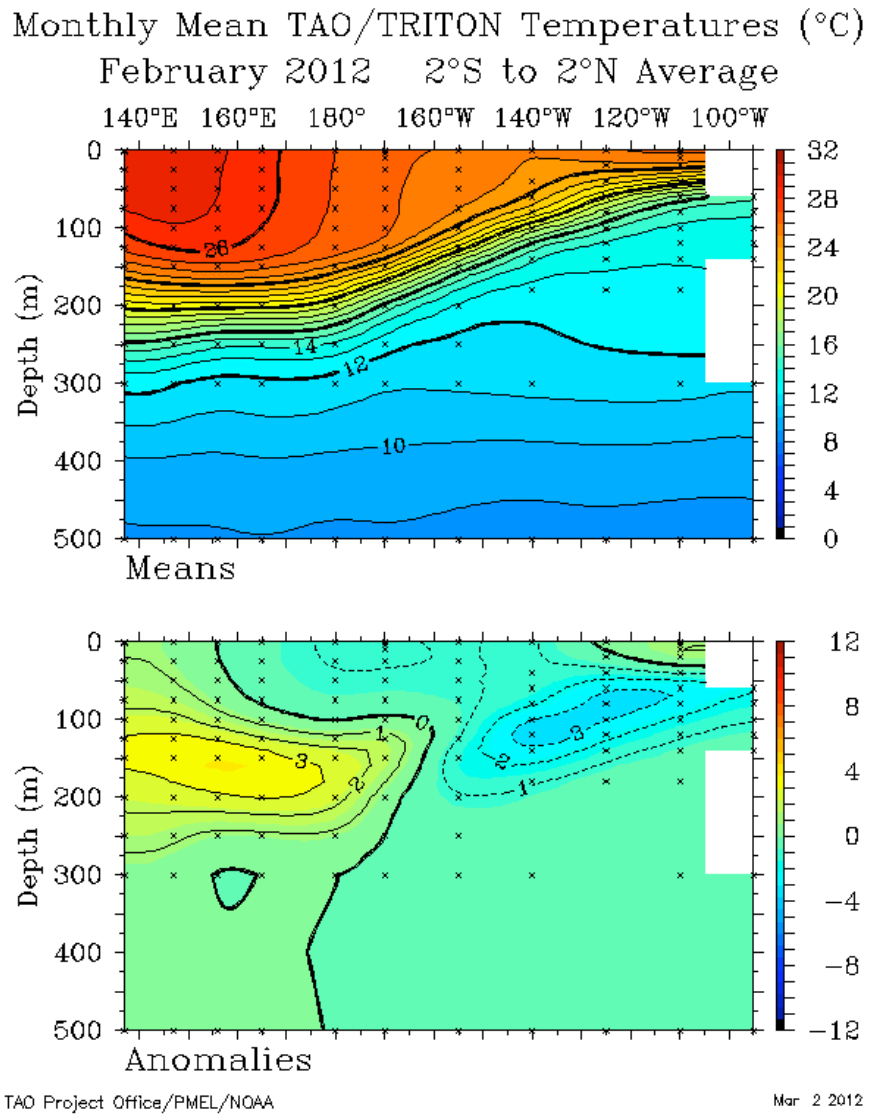
Recycled text:
I said this last year

Last week's SST and SST anomalies



El Niño at the Peru coast:

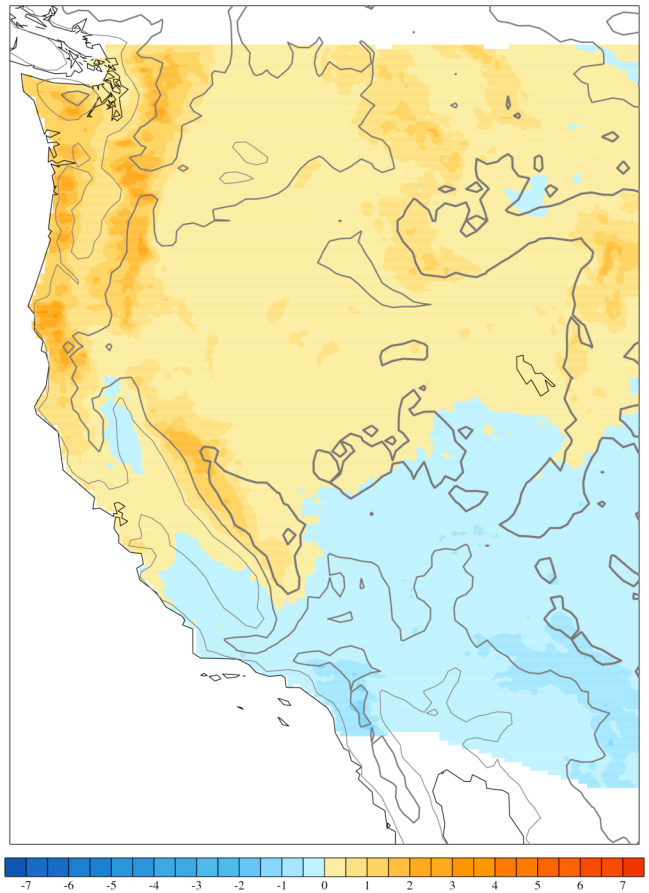
- positive SST anomalies
- Raining in the northern coastal desert



Shallow warm anomalies in the eastern equatorial Pacific

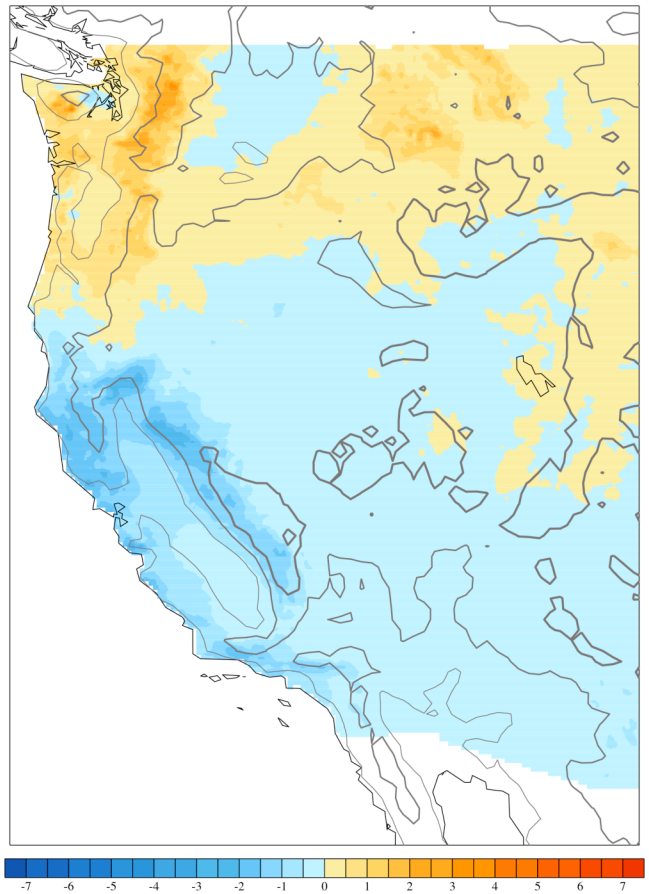
http://www.pmel.noaa.gov/tao/jsdisplay/monthly-summary/sumgif/Dep_Sec_EQ_Mon.gif

Cold ENSO NDJFMA precipitation anomalies (cm, PRISM, 1900-2009)



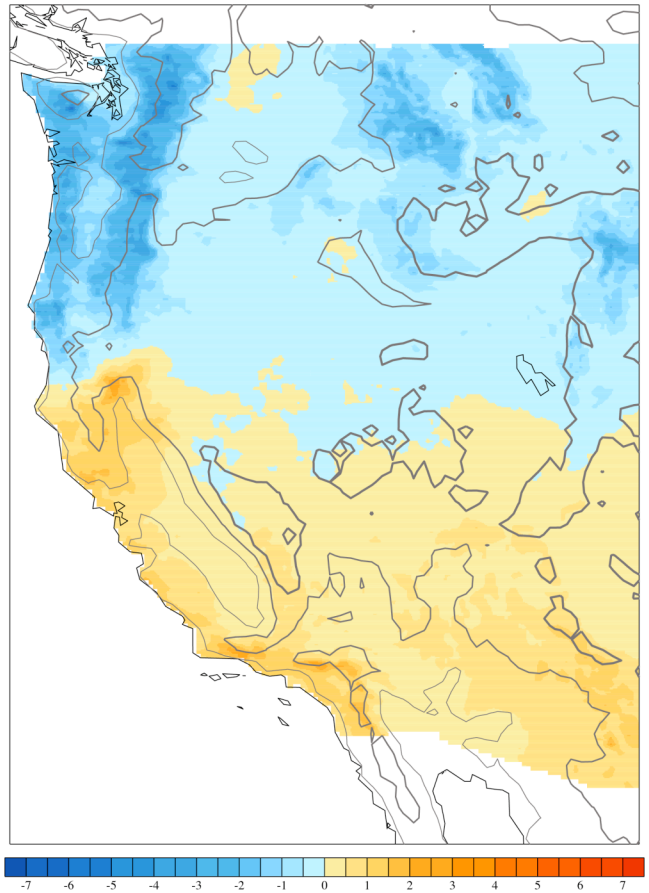
250, 1000, 2000 meter elevation contours

Neutral ENSO NDJFMA precipitation anomalies (cm, PRISM, 1900-2009)



250, 1000, 2000 meter elevation contours

Warm ENSO NDJFMA precipitation anomalies (cm, PRISM, 1900-2009)



250, 1000, 2000 meter elevation contours